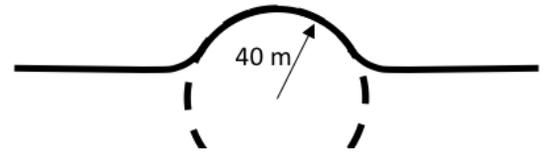


You will be graded on your communication of physics understanding.

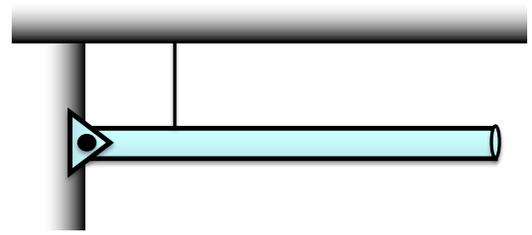
#1 You know a road with a round hump of radius 40 m as shown. You drive over it at a speed of 10 m/s. Your 50-kg body is sitting on a scale. As you go over the top of the bump, what should the scale be reading? Your process is more important than your answer.



#2 True Story: I know a carousel at a playground. I wish I knew the moment of inertia of it,. While I can measure dimensions, I know nothing about its mass distribution or even what the mass is. How could I measure the moment of inertia? You know what I have in the Physics “toy room”... I have all kinds of force scales, I have masses and wheels and all kinds of other things. I can take a video with my cell phone. Please figure out a way for me to measure the moment of inertia with a complete lens explanation, and set up the correct equations. I can think of several ways...likely the class will find even more ways.

#3 You see at right a uniform, 10 m long, 200 kg steel “I” beam that is attached to the wall with a rotating hinge. A vertical cable, attached 2 m from the wall prevents the beam from rotating downward on the hinge, holding it in place as shown.

- a) Find the tension in the cable
- b) Is there any force on the hinge attached to the wall? If not, explain why you know. If so, find the force on the wall (include direction)



#4 I pull with a force of 100 N on a chain, towing two 20-kg toy railroad cars in a row attached to each other with string. The car in front has low-friction wheels, but the car at the back has no wheels and slides on the rails with a coefficient of friction of 0.1. I pull it for 10 meters.

- Is the system in equilibrium? How do you know?
- Please find whatever you can, but ideally, I'd like to know the tension in the string between the two cars.



Name \_\_\_\_\_